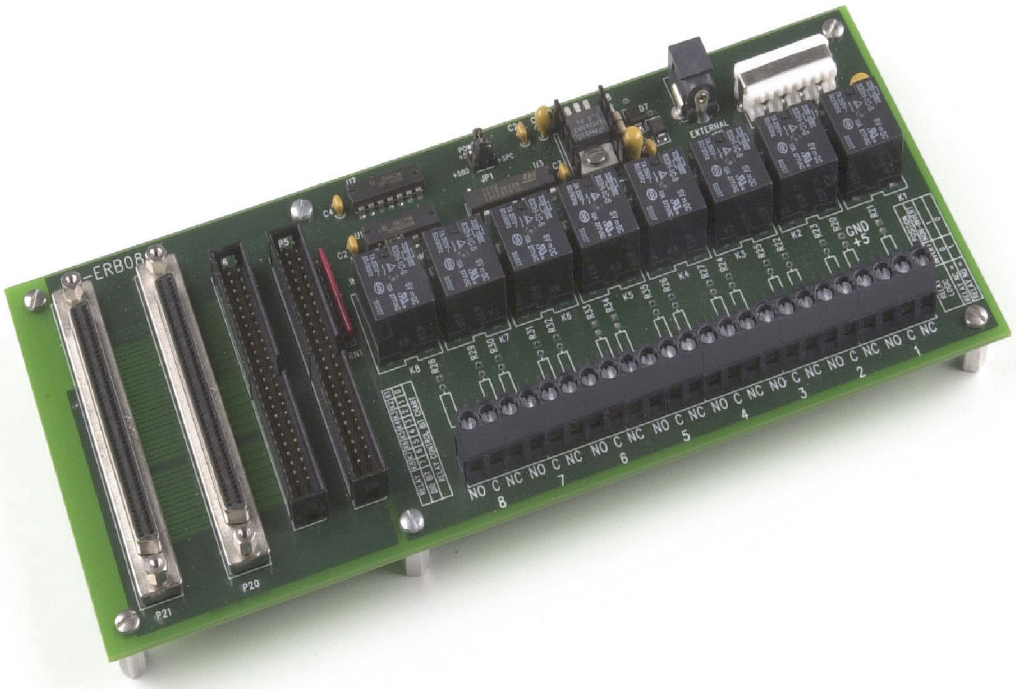
6K-ERB08

Eight-relay Accessory Board
For use with PCI-DAS6000 Series and
PCI-DAC6700 Series Boards

User's Guide



MEASUREMENT COMPUTING™

6K-ERB08

8-relay accessory board
for use with PCI-DAS6000 Series and
PCI-DAC6700 Series boards

User's Guide

MEASUREMENT
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Table of Contents

Preface
About this User's Guide vi
What you will learn from this user's guide vi
Conventions in this user's guide vi
Where to find more information vi

Chapter 1
Introducing the 6K-ERB08 1-1
Overview: 6K-ERB08 features 1-1
Software features 1-1

Chapter 2
Installing the 6K-ERB08 2-1
What comes with your 6K-ERB08 shipment? 2-1
Hardware 2-1
Additional documentation 2-2
Optional components 2-2
Unpacking the 6K-ERB08 2-2
Connecting the 6K-ERB08 for I/O operations 2-2
Connectors, cables – interface I/O connectors 2-3
Pin out – interface connectors 2-4
Signal cables 2-7
Connecting to your 6000 Series control board 2-8
Configuring your 6K-ERB08 board 2-8
Power source 2-9
Relay logic 2-10

Chapter 3
Functional Details 3-1
6K-ERB08 block diagram 3-1
Components 3-2
Screw terminal connections 3-3
Wire gauge 3-3
Power up conditions 3-3
Relay contact protection circuit for inductive loads 3-4
6K-ERB08 assembly diagram 3-5

Chapter 4
Specifications 4-1
Power consumption 4-1
Output specification 4-1
Environmental 4-1
Mechanical 4-1
Relay screw terminals 4-2
Relay logic jumper (JP2) 4-2
Power-in jumper (JP1) 4-2
Relays pull-up/down option 4-2
Compatible products 4-3
Main connectors and pin out 4-3

User connector P20 4-3
User connector P21 4-4
User connector P5 4-5
User connector P6 4-6

About this User's Guide

What you will learn from this user's guide

This user's guide explains how to install, configure, and use the 6K-ERB08 so that you get the most out of its features.

This user's guide also refers you to related documents available on our web site, and to technical support resources.

Conventions in this user's guide

For more information on …

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

Caution! Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

<#:#> Angle brackets that enclose numbers separated by a colon signify a range of numbers, such as those assigned to registers, bit settings, etc.

bold text **Bold** text is used for the names of objects on the screen, such as buttons, text boxes, and check boxes. For example:
1. Insert the disk or CD and click the **OK** button.

italic text *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase. For example:
The *Insta*Cal installation procedure is explained in the *Quick Start Guide*.
Never touch the exposed pins or circuit connections on the board.

Where to find more information

The following electronic documents provide information that is relevant to the operation of the 6K-ERB08.

- MCC's *Specifications: 6K-ERB08* (the PDF version of the *Specifications* chapter in this guide) is available on our web site at www.mccdaq.com/pdfs/6K-ERB08.pdf.
- MCC's *Quick Start Guide* is available on our web site at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.
- MCC's *Guide to Signal Connections* is available on our web site at www.mccdaq.com/signals/signals.pdf.
- MCC's *Universal Library User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf.
- MCC's *Universal Library Function Reference* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-functions.pdf.
- MCC's *Universal Library for LabVIEW™ User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/SM-UL-LabVIEW.pdf.

6K-ERB08 User's Guide (this document) is also available on our web site at www.mccdaq.com/PDFmanuals/6K-ERB08.pdf.

Links to the hardware manuals for each board supported by the 6K-ERB08 are listed below:

PCI-DAS6000 Series board	Online User's Guide
PCI-DAS6013, PCI-DAS6014	www.mccdaq.com/PDFmanuals/pci-das6013-6014.pdf
PCI-DAS6023, PCI-DAS6025	www.mccdaq.com/PDFmanuals/pci-das6025-23.pdf
PCI-DAS6030, PCI-DAS6032	www.mccdaq.com/PDFmanuals/pci-das6030-32.pdf
PCI-DAS6031, PCI-DAS6033	www.mccdaq.com/PDFmanuals/pci-das6031-33.pdf
PCI-DAS6034, PCI-DAS6035, PCI-DAS6036	www.mccdaq.com/PDFmanuals/pci-das603x.pdf
PCI-DAS6040	www.mccdaq.com/PDFmanuals/pci-das6040.pdf
PCI-DAS6052	www.mccdaq.com/PDFmanuals/pci-das6052.pdf
PCI-DAS6070	www.mccdaq.com/PDFmanuals/pci-das6070.pdf
PCI-DAS6071	www.mccdaq.com/PDFmanuals/pci-das6071.pdf
PCI-DAC6700 Series boards	
PCI-DAC6702, PCI-DAC6703	www.mccdaq.com/PDFmanuals/pci-dac670x.pdf

Introducing the 6K-ERB08

Overview: 6K-ERB08 features

This manual explains how to install and connect the 6K-ERB08 board with supported Measurement Computing hardware. You can use the 6K-ERB08 in your control applications to switch on and off a variety of devices, such as fans, blowers, pumps, etc.

The 6K-ERB08 has eight single-pole double-throw (SPDT) Form C electromechanical relays that are controlled by eight digital channels connected to them. The AUXPORT digital I/O lines (DIO0 – DIO7) on your PCI-DAS6000 Series board or PCI-DAC6700 Series board directly control the relays on your 6K-ERB08. The PCI-DAS6000 Series board and PCI-DAC6700 Series board are referred to as the "6000 Series control board" for the remainder of this guide.

The 6K-ERB08 has two 100-pin and two 50-pin interface connectors. Use one of these connectors to connect to your 6000 Series control board. You can use the additional connectors to daisy chain the 6K-ERB08 to different accessory boards.

A 10 k pull-down resistor is installed at each relay control line to pull the digital relay control line low when disconnected from the 6000 Series control board, or when the digital lines on the 6000 Series control board are in high impedance (or input) mode. You set the relay logic for active high or low with an on-board jumper.

The 6K-ERB08 has 24 screw terminals for connecting your field wiring to the relay contacts. Each relay provides three connections – normally open (NO), normally closed (NC) and common (C). The board has component locations where you can install a pull-up or pull-down resistor at the NO and NC connections.

You can power the 6K-ERB08 from your PCI-DAS6000 Series board, from your computer's power connectors, or from the AC adapter included with your 6K-ERB08. You set the power source with an on-board jumper.

Software features

For information on the features of *Insta*Cal and the other software included with your 6K-ERB08, refer to the *Quick Start Guide* that shipped with your device. The *Quick Start Guide* is also available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Check www.mccdaq.com/download.htm for the latest software version or versions of the software supported under less commonly used operating systems.

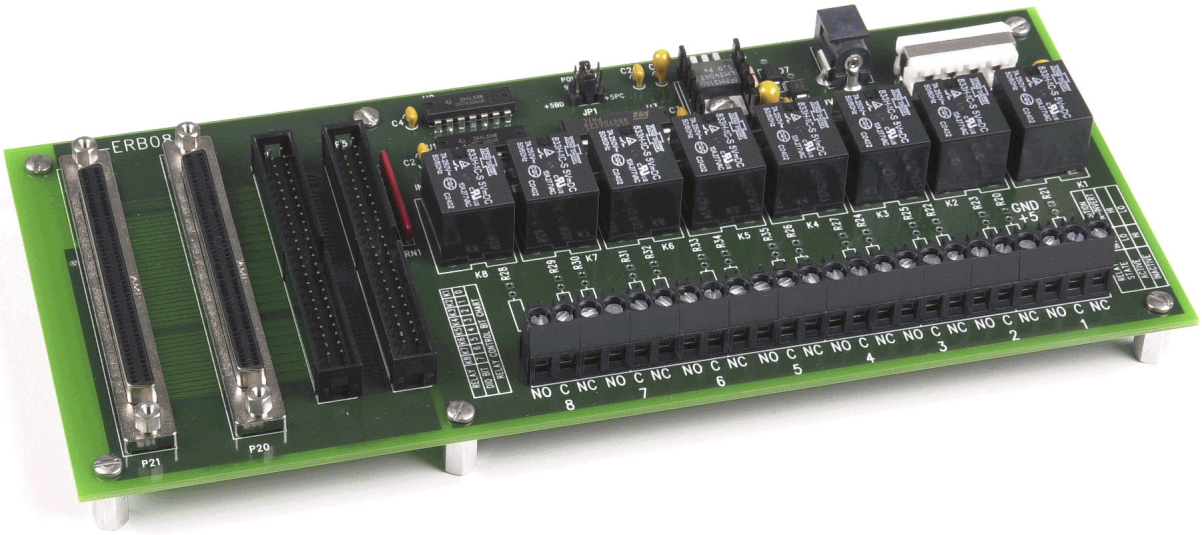
Installing the 6K-ERB08

What comes with your 6K-ERB08 shipment?

The following items are shipped with the 6K-ERB08.

Hardware

- 6K-ERB08 (shown with standoffs attached)



- C-PCPOWER-10 cable — 10 foot cable that you can connect to your computer's +5 V power supply connectors or to an external +5 V power supply.

- CB-PWR-9 AC adapter — 9 volt, 1 amp DC power supply, 110 VAC input.

- Six (6) standoffs with screws for attaching to the 6K-ERB08 board

Additional documentation

In addition to this hardware user's guide, you should also receive the *Quick Start Guide* (available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf). This booklet supplies a brief description of the software you received with your 6K-ERB08 and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

Optional components

- Cables

C100MMS-*x*

C100HD50-*x*

C50FF-*x*

Unpacking the 6K-ERB08

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the 6K-ERB08 from its packaging, ground yourself using a wrist strap or by simply touching the computer chassis or other grounded object to eliminate any stored static charge.

If any components are missing or damaged, notify Measurement Computing Corporation immediately by phone, fax, or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Connecting the 6K-ERB08 for I/O operations

Follow the guidelines below when connecting the 6K-ERB08 to your computer and to your MCC hardware.

- Make sure your connections to the 6K-ERB08 do not exceed any of the specified maximum ratings, or you could damage the 6K-ERB08, your computer, and your 6000 Series control board. The maximum ratings for connections to the 6K-ERB08 are listed in Chapter 4 "Specifications ."
- Turn off your PC and any 6K-ERB08 power sources before you connect or disconnect the cable from the 6K-ERB08 to the 6000 Series control board.
- Connect one of the interface connectors to the 6000 Series control board's interface cable. Refer to Table 2-1 for appropriate cable and connector combinations.

  The remaining interface connectors are provided for connections to other accessory boards, such as the CIO-MINI50 or CIO-TERM100 screw terminal boards.

External power is required when using the C100HD50-x cable

The C100HD50-x cable does not provide power to the 6K-ERB08. If you use the C100HD50-x cable, power the 6K-ERB08 with an external power source.

Caution! Connect the 6K-ERB08 to a PCI-DAS6000 Series board or to a PCI-DAC6700 Series board only. Connecting to a board that is not supported by the 6K-ERB08 can damage both boards.

Connectors, cables – interface I/O connectors

The 6K-ERB08 board's eight relays are controlled by your 6000 Series control board's digital channels through AUXPORT. Digital channels DIO<0:7> correspond to relays 1 to 8. Connect your signal cable from the 6000 Series control board's interface connector to one of the interface connectors on the relay board.

The 6K-ERB08 has two 100-pin interface connectors labeled **P21** and **P20**, and two 50-pin interface connectors labeled **P6** and **P5**. Signals pass through each connector. Only connect one of the four interface connectors to your 6000 Series control board.

Table 2-1 lists the board connectors, applicable cables, and compatible MCC hardware for the 6K-ERB08.

Table 2-1. Board connectors, cables, and compatible hardware

Connector type	▪ P21 and P20: Shielded, SCSI 100-pin D-type ▪ P6 and P5: Unshielded 50 pin ribbon connector
Compatible cable (connect to P21 or P20)	C100MMS-x shielded round cable (Figure 2-1). x = 1, 2, or 3 meters
Compatible cable (connect to P6 or P5)	▪ C100HD50-x shielded round cable (Figure 2-2). x = 3 or 6 feet ▪ C50FF-x unshielded ribbon cable (Figure 2-3) x = 1, 2, 3, 4, 5, 10, 15, 20, 25 or 50 feet **Note**: These cables do not provide power to the 6K-ERB08. External power is required.
Compatible MCC hardware	**PCI-DAS6000 Series** boards: ▪ PCI-DAS6013 ▪ PCI-DAS6014 ▪ PCI-DAS6030 ▪ PCI-DAS6031 ▪ PCI-DAS6032 ▪ PCI-DAS6033 ▪ PCI-DAS6034 ▪ PCI-DAS6035 ▪ PCI-DAS6036 ▪ PCI-DAS6052 ▪ PCI-DAS6023 ▪ PCI-DAS6025 ▪ PCI-DAS6040 ▪ PCI-DAS6070 ▪ PCI-DAS6071
	PCI-DAC6700 Series analog output boards: ▪ PCI-DAC6702 ▪ PCI-DAC6703

Daisy chaining to other 6K-ERB08 boards

Do not daisy chain additional 6K-ERB08 boards to the extra interface connectors, since any additional boards would be controlled with the same DIO lines.

Pin out – interface connectors

Table 2-2. Connector P20 pin out

Signal Name	Pin		Pin	Signal Name
GND	100	• •	50	GND
P21 Pass Through 99	99	• •	49	P21 Pass Through 49
P21 Pass Through 98	98	• •	48	P21 Pass Through 48
P21 Pass Through 97	97	• •	47	P21 Pass Through 47
P21 Pass Through 96	96	• •	46	P21 Pass Through 46
P21 Pass Through 95	95	• •	45	P21 Pass Through 45
P21 Pass Through 94	94	• •	44	P21 Pass Through 44
P21 Pass Through 93	93	• •	43	P21 Pass Through 43
DIO7	92	• •	42	P21 Pass Through 42
DIO6	91	• •	41	P21 Pass Through 41
DIO5	90	• •	40	P21 Pass Through 40
DIO4	89	• •	39	PC +5V
DIO3	88	• •	38	P21 Pass Through 38
DIO2	87	• •	37	P21 Pass Through 37
DIO1	86	• •	36	P21 Pass Through 36
DIO0	85	• •	35	P21 Pass Through 35
P21 Pass Through 84	84	• •	34	P21 Pass Through 34
P21 Pass Through 83	83	• •	33	P21 Pass Through 33
P21 Pass Through 82	82	• •	32	P21 Pass Through 32
P21 Pass Through 81	81	• •	31	P21 Pass Through 31
P21 Pass Through 80	80	• •	30	P21 Pass Through 30
P21 Pass Through 79	79	• •	29	P21 Pass Through 29
P21 Pass Through 78	78	• •	28	P21 Pass Through 28
P21 Pass Through 77	77	• •	27	P21 Pass Through 27
P21 Pass Through 76	76	• •	26	P21 Pass Through 26
P21 Pass Through 75	75	• •	25	P21 Pass Through 25
P21 Pass Through 74	74	• •	24	P21 Pass Through 24
P21 Pass Through 73	73	• •	23	P21 Pass Through 23
P21 Pass Through 72	72	• •	22	P21 Pass Through 22
P21 Pass Through 71	71	• •	21	P21 Pass Through 21
P21 Pass Through 70	70	• •	20	P21 Pass Through 20
P21 Pass Through 69	69	• •	19	P21 Pass Through 19
P21 Pass Through 68	68	• •	18	P21 Pass Through 18
P21 Pass Through 67	67	• •	17	P21 Pass Through 17
P21 Pass Through 66	66	• •	16	P21 Pass Through 16
P21 Pass Through 65	65	• •	15	P21 Pass Through 15
P21 Pass Through 64	64	• •	14	P21 Pass Through 14
P21 Pass Through 63	63	• •	13	P21 Pass Through 13
P21 Pass Through 62	62	• •	12	P21 Pass Through 12
P21 Pass Through 61	61	• •	11	P21 Pass Through 11
P21 Pass Through 60	60	• •	10	P21 Pass Through 10
P21 Pass Through 59	59	• •	9	P21 Pass Through 9
P21 Pass Through 58	58	• •	8	P21 Pass Through 8
P21 Pass Through 57	57	• •	7	P21 Pass Through 7
P21 Pass Through 56	56	• •	6	P21 Pass Through 6
P21 Pass Through 55	55	• •	5	P21 Pass Through 5
P21 Pass Through 54	54	• •	4	P21 Pass Through 4
P21 Pass Through 53	53	• •	3	P21 Pass Through 3
P21 Pass Through 52	52	• •	2	P21 Pass Through 2
P21 Pass Through 51	51	• •	1	P21 Pass Through 1

Table 2-3. Connector P21 pin out

Signal Name	Pin		Pin	Signal Name
GND	100	••	50	GND
P20 Pass Through 99	99	••	49	P20 Pass Through 49
P20 Pass Through 98	98	••	48	P20 Pass Through 48
P20 Pass Through 97	97	••	47	P20 Pass Through 47
P20 Pass Through 96	96	••	46	P20 Pass Through 46
P20 Pass Through 95	95	••	45	P20 Pass Through 45
P20 Pass Through 94	94	••	44	P20 Pass Through 44
P20 Pass Through 93	93	••	43	P20 Pass Through 43
DIO7	92	••	42	P20 Pass Through 42
DIO6	91	••	41	P20 Pass Through 41
DIO5	90	••	40	P20 Pass Through 40
DIO4	89	••	39	PC +5V
DIO3	88	••	38	P20 Pass Through 38
DIO2	87	••	37	P20 Pass Through 37
DIO1	86	••	36	P20 Pass Through 36
DIO0	85	••	35	P20 Pass Through 35
P20 Pass Through 84	84	••	34	P20 Pass Through 34
P20 Pass Through 83	83	••	33	P20 Pass Through 33
P20 Pass Through 82	82	••	32	P20 Pass Through 32
P20 Pass Through 81	81	••	31	P20 Pass Through 31
P20 Pass Through 80	80	••	30	P20 Pass Through 30
P20 Pass Through 79	79	••	29	P20 Pass Through 29
P20 Pass Through 78	78	••	28	P20 Pass Through 28
P20 Pass Through 77	77	••	27	P20 Pass Through 27
P20 Pass Through 76	76	••	26	P20 Pass Through 26
P20 Pass Through 75	75	••	25	P20 Pass Through 25
P20 Pass Through 74	74	••	24	P20 Pass Through 24
P20 Pass Through 73	73	••	23	P20 Pass Through 23
P20 Pass Through 72	72	••	22	P20 Pass Through 22
P20 Pass Through 71	71	••	21	P20 Pass Through 21
P20 Pass Through 70	70	••	20	P20 Pass Through 20
P20 Pass Through 69	69	••	19	P20 Pass Through 19
P20 Pass Through 68	68	••	18	P20 Pass Through 18
P20 Pass Through 67	67	••	17	P20 Pass Through 17
P20 Pass Through 66	66	••	16	P20 Pass Through 16
P20 Pass Through 65	65	••	15	P20 Pass Through 15
P20 Pass Through 64	64	••	14	P20 Pass Through 14
P20 Pass Through 63	63	••	13	P20 Pass Through 13
P20 Pass Through 62	62	••	12	P20 Pass Through 12
P20 Pass Through 61	61	••	11	P20 Pass Through 11
P20 Pass Through 60	60	••	10	P20 Pass Through 10
P20 Pass Through 59	59	••	9	P20 Pass Through 9
P20 Pass Through 58	58	••	8	P20 Pass Through 8
P20 Pass Through 57	57	••	7	P20 Pass Through 7
P20 Pass Through 56	56	••	6	P20 Pass Through 6
P20 Pass Through 55	55	••	5	P20 Pass Through 5
P20 Pass Through 54	54	••	4	P20 Pass Through 4
P20 Pass Through 53	53	••	3	P20 Pass Through 3
P20 Pass Through 52	52	••	2	P20 Pass Through 2
P20 Pass Through 51	51	••	1	P20 Pass Through 1

Table 2-4. Connector P5 pin out

Signal Name	Pin		Pin	Signal Name
GND	50	••	49	P6 Pass Through 99
P6 Pass Through 98	48	••	47	P6 Pass Through 97
P6 Pass Through 96	46	••	45	P6 Pass Through 95
P6 Pass Through 94	44	••	43	P6 Pass Through 93
DIO7	42	••	41	DIO6
DIO5	40	••	39	DIO4
DIO3	38	••	37	DIO2
DIO1	36	••	35	DIO0
P6 Pass Through 84	34	••	33	P6 Pass Through 83
P6 Pass Through 82	32	••	31	P6 Pass Through 81
P6 Pass Through 80	30	••	29	P6 Pass Through 79
P6 Pass Through 78	28	••	27	P6 Pass Through 77
P6 Pass Through 76	26	••	25	P6 Pass Through 75
P6 Pass Through 74	24	••	23	P6 Pass Through 73
P6 Pass Through 72	22	••	21	P6 Pass Through 71
P6 Pass Through 70	20	••	19	P6 Pass Through 69
P6 Pass Through 68	18	••	17	P6 Pass Through 67
P6 Pass Through 66	16	••	15	P6 Pass Through 65
P6 Pass Through 64	14	••	13	P6 Pass Through 63
P6 Pass Through 62	12	••	11	P6 Pass Through 61
P6 Pass Through 60	10	••	9	P6 Pass Through 59
P6 Pass Through 58	8	••	7	P6 Pass Through 57
P6 Pass Through 56	6	••	5	P6 Pass Through 55
P6 Pass Through 54	4	••	3	P6 Pass Through 53
P6 Pass Through 52	2	••	1	P6 Pass Through 51

Table 2-5. Connector P6 pin out

Signal Name	Pin		Pin	Signal Name
GND	50	••	49	P5 Pass Through 99
P5 Pass Through 98	48	••	47	P5 Pass Through 97
P5 Pass Through 96	46	••	45	P5 Pass Through 95
P5 Pass Through 94	44	••	43	P5 Pass Through 93
DIO7	42	••	41	DIO6
DIO5	40	••	39	DIO4
DIO3	38	••	37	DIO2
DIO1	36	••	35	DIO0
P5 Pass Through 84	34	••	33	P5 Pass Through 83
P5 Pass Through 82	32	••	31	P5 Pass Through 81
P5 Pass Through 80	30	••	29	P5 Pass Through 79
P5 Pass Through 78	28	••	27	P5 Pass Through 77
P5 Pass Through 76	26	••	25	P5 Pass Through 75
P5 Pass Through 74	24	••	23	P5 Pass Through 73
P5 Pass Through 72	22	••	21	P5 Pass Through 71
P5 Pass Through 70	20	••	19	P5 Pass Through 69
P5 Pass Through 68	18	••	17	P5 Pass Through 67
P5 Pass Through 66	16	••	15	P5 Pass Through 65
P5 Pass Through 64	14	••	13	P5 Pass Through 63
P5 Pass Through 62	12	••	11	P5 Pass Through 61
P5 Pass Through 60	10	••	9	P5 Pass Through 59
P5 Pass Through 58	8	••	7	P5 Pass Through 57
P5 Pass Through 56	6	••	5	P5 Pass Through 55
P5 Pass Through 54	4	••	3	P5 Pass Through 53
P5 Pass Through 52	2	••	1	P5 Pass Through 51

Information on signal connections

For general information about signal connection and configuration, refer to the *Guide to Signal Connections* on our web site at www.mccdaq.com/signals/signals.pdf.

Signal cables

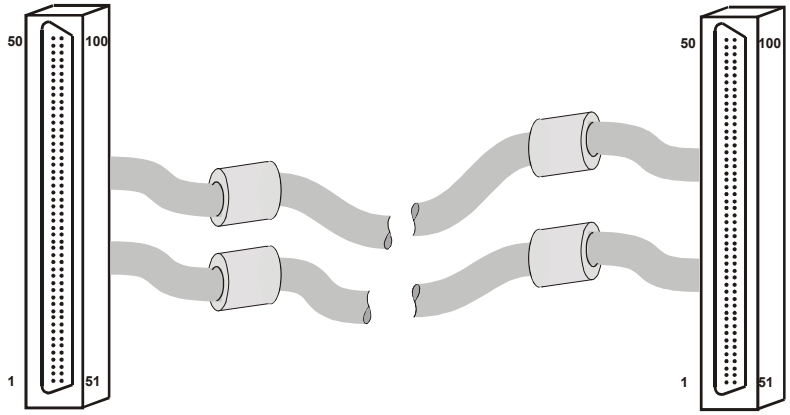


Figure 2-1. C100MMS-*x* cable

Details on the C100MMS-x cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=104&pf_id=1514.

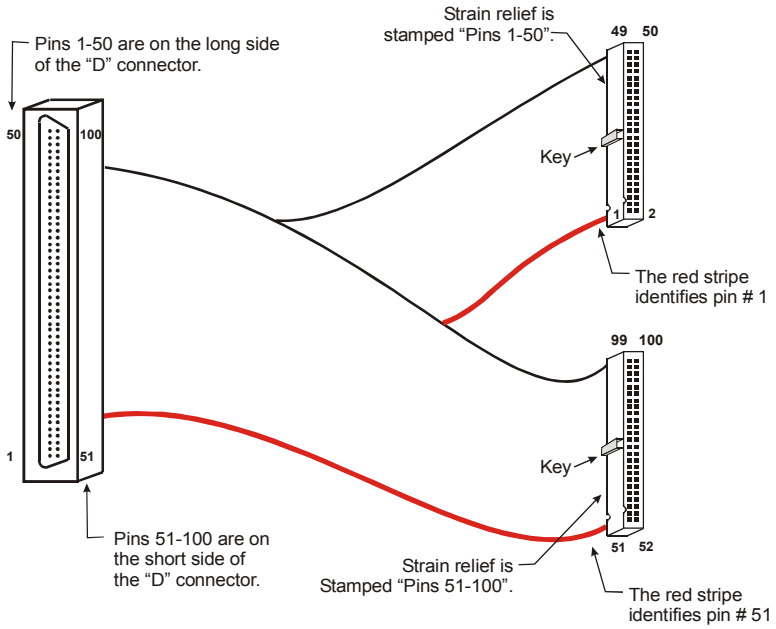


Figure 2-2. C100HD50-*x* cable

Details on the C100HD50-x cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=104&pf_id=1203.

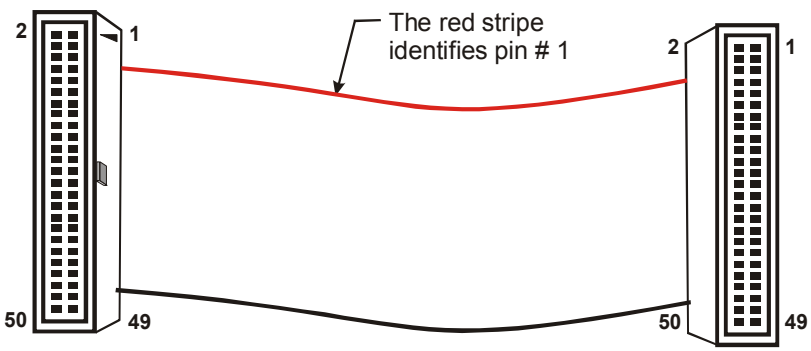


Figure 2-3. C50FF-*x* cable

Details on the C50FF-*x* cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=104&pf_id=136.

Connecting to your 6000 Series control board

The following procedure provides the general steps to follow to connect your 6K-ERB08 to a PCI-DAS6000 Series board or to a PCI-DAC6700 Series board.

1. Turn off your computer and open the cover.
2. Install your PCI-DAS6000 Series or PCI-DAC6700 Series board in the computer. Refer to your board's hardware User Guide for installation instructions.
3. Connect the digital signal cable from one of the interface connectors on the 6K-ERB08 to the 100-pin interface connector on your 6000 Series control board. Your signal cable determines which interface connector to connect to.
   - **C100MMS-x** cable: Connect one end of the cable to either 100-pin interface connector (**P21** or **P20**) on the 6K-ERB08, and connect the other end of the cable to the 100-pin interface connector on the 6000 Series control board.
   - **C100HD50-x** cable: Connect the 50-pin cable end stamped **Pins 51 to 100** to either 50-pin connector (**P6** or **P5**) on the 6K-ERB08, and connect the 100-pin cable end to the 100-pin interface connector on the 6000 Series control board.

External power is required when using the C100HD50-x cable

The C100HD50-x cable does not provide power to the 6K-ERB08. If you use the C100HD50-x cable, power the 6K-ERB08 with an external power source.

4. To connect other accessory boards or devices to your 6K-ERB08, use the remaining 100-pin interface connector and/or the two 50-pin connectors for the connection(s). The following typical configurations are possible:
   - When using a C100MMS-x cable, you can use a second C100MMS-x cable to daisy chain to an SCB-100 accessory board, OR you could use a C50FF-x cable to daisy chain to a 50-pin accessory board.
   - When using a C100HD50-x cable, you can use a C50FF-x cable to daisy chain to a 50-pin accessory board.

Configuring your 6K-ERB08 board

Configure the power source jumper and relay logic jumper before using the 6K-ERB08. The factory-configured default settings are listed in Table 2-6.

Table 2-6. Default hardware configuration

Jumper label	Jumper description	Default setting
POWER IN **JP1**	Sets the power source to one of three options: ▪ **+5BD**: +5V power from your 6000 Series control board. ▪ **+5PC**: +5V power from the computer's power supply. ▪ **+9V EXT**: power from an AC adapter.	+5BD
INVERT / NON-INVERT **JP2**	Sets the relay logic for active high or active low.	NON-INVERT (active high)

Figure 2-4 shows the location of the jumpers and external power connectors.

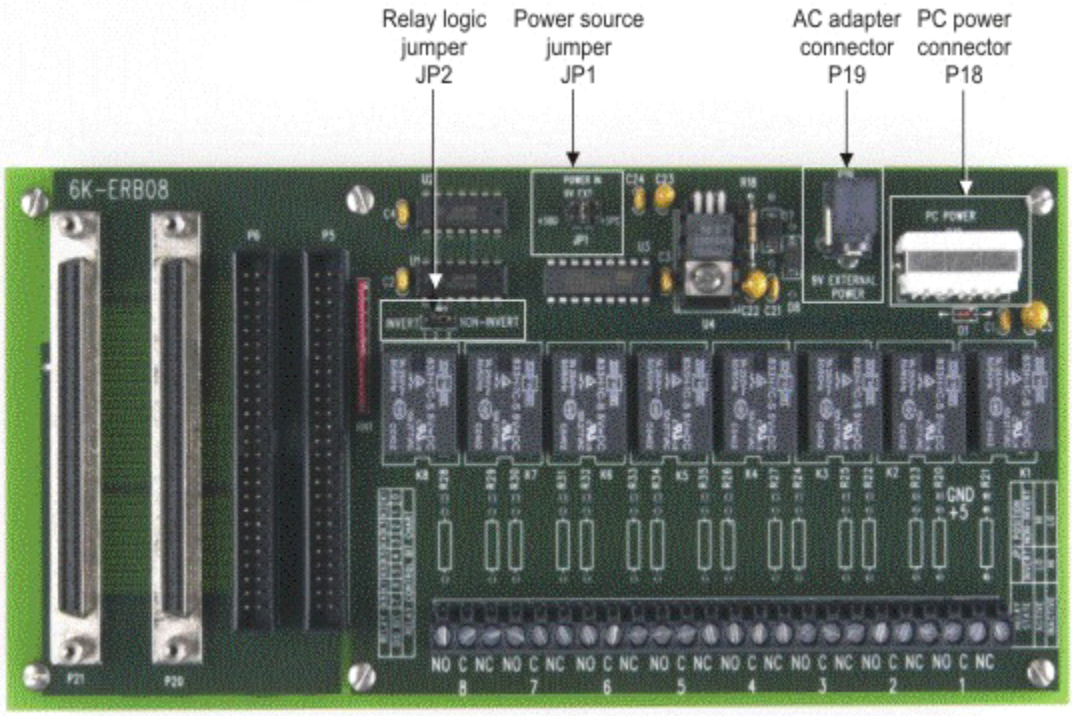

Relay logic jumper JP2
Power source jumper JP1
AC adapter connector P19
PC power connector P18
6K-ERB08
PC POWER
9V EXTERNAL POWER
INVERT
NON-INVERT
GND
+5
NO C NC NO C NC NO C NC NO C NC NO C NC NO C NC NO C NC NO C NC
8 7 6 5 4 3 2 1
P21
P20

Figure 2-4. 6K-ERB08 board jumpers and external power connectors

Power source

Set the power source with jumper **JP1** (labeled **POWER IN**). You can power the 6K-ERB08 using one of the following sources.

- The 6000 Series control board's internal +5 V power supply (default)
- Your computer's +5 V power supply, or external +5 V supply (power cable supplied)
- AC adapter (supplied)

Figure 2-5 shows the **POWER IN** jumper setting for each power source.

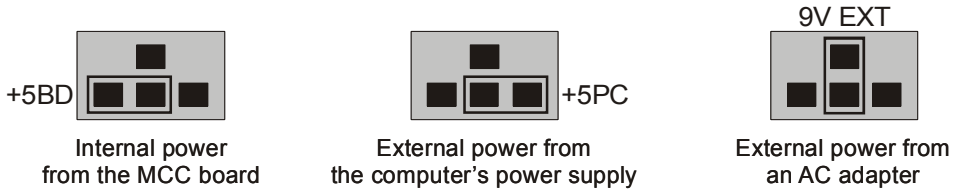


Figure 2-5. Power source jumper JP1configurations

External +5 V PC power connections

You can power the 6K-ERB08 with your computer's +5 V power supply using the **C-PCPOWER-10** cord that was shipped with the board. Each end of the cable has a keyed MOLEX type connector. To connect to your computer's internal power connectors, do the following:

1. Turn your computer off, remove the cover, and insert your board into an available PCI slot.
2. Close your computer and turn it on.
3. Turn off power to the computer and remove the cover.
4. Connect one end of the C-PCPOWER10 power cord to one of your computer's internal power connectors. If necessary, refer to your computer's user manual for the location of the power supply connectors.
5. Run the power cable out the back of the computer through an expansion slot or other opening, and replace the cover on the computer.

Caution! Be careful not to pinch the cable when you replace the cover — if this cable is cut, the resulting short circuit can damage the computer.

6. Connect the other end of the power cord to the connector labeled **PC POWER** connector (**P18**) on the 6K-ERB08.
7. Set the **POWER IN** jumper (**JP1**) for **+5PC**.

External +9V AC power adapter connections

You can power the 6K-ERB08 using the AC power adapter (MCC part number CB-PWR-9). This adapter provides 9 volt, 1 amp DC power, 110 VAC power. To connect the AC adapter, do the following.

1. Turn off power to the computer.
2. Connect the CB-PWR-9 cable to the **9V EXTERNAL POWER** connector (**P19**).
3. Plug the AC adapter into a power outlet.
4. Configure the **POWER IN** jumper (**JP1**) for **9V EXT**.

Relay logic

Use jumper **JP2** to select inverting or non-inverting logic to control the relays. Refer to Figure 2-4 for the location of this jumper. The relay logic jumper is shown here configured for **NON-INVERT** (digital high). This is the default position.

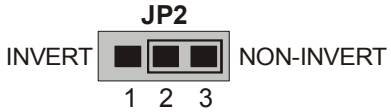


Figure 2-6. Relay logic jumper JP2 (default position)

- When set to **non-invert**, the relay activates when the DIO signal is high (1), and becomes inactive (non-energized) when the DIO signal is low (0).
- When set to **invert**, the relay activates when the DIO signal is low (0), and becomes inactive (non-energized) when the DIO signal is high (1).

Table 2-7 summarizes the relay state in conjunction with the relay logic jumper setting.

Table 2-7. Relay state and jumper position

Relay state	JP2 position	
	INVERT	**NON-INVERT**
Active (energized)	LO	HI
Inactive (not-energized)	HI	LO

Functional Details

6K-ERB08 block diagram

6K-ERB08 functions are illustrated in the block diagram shown here.

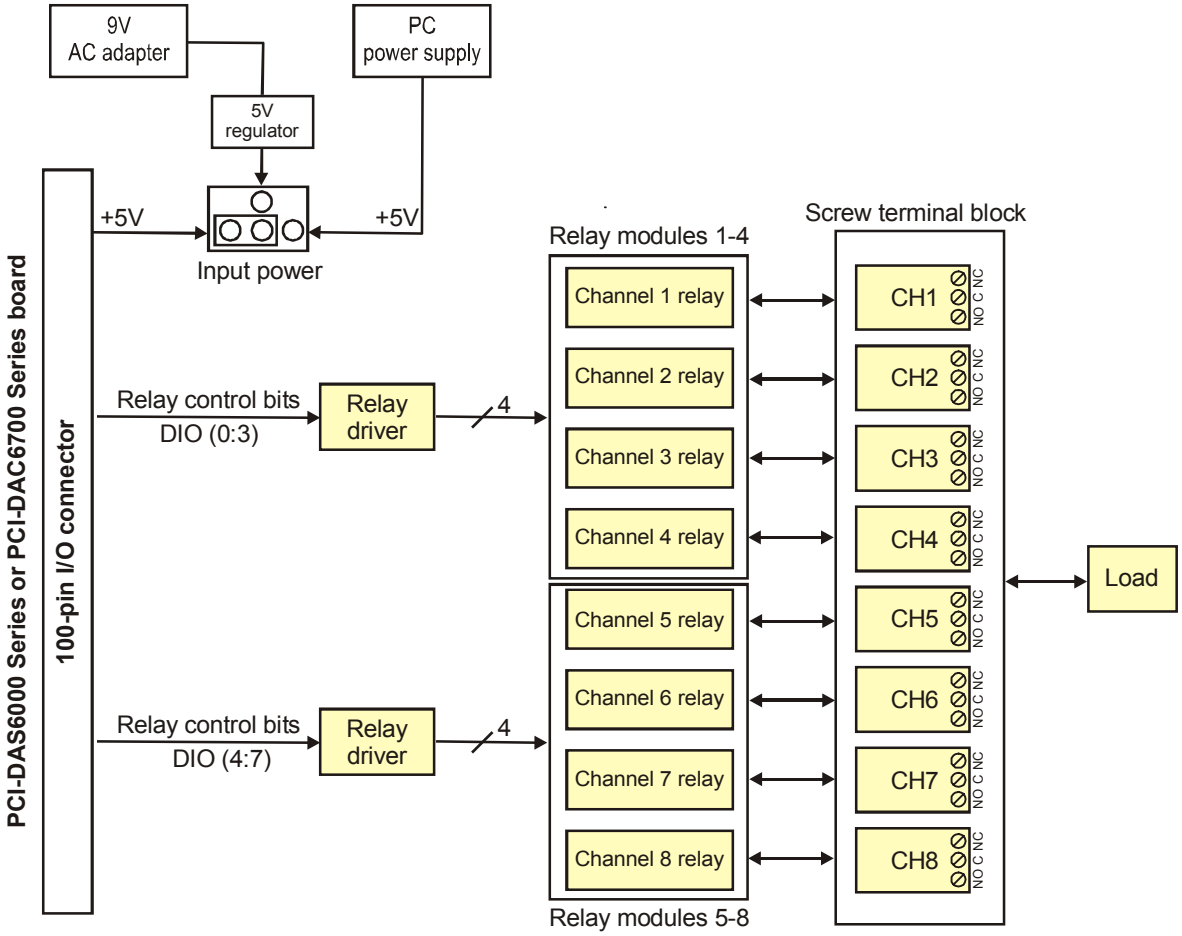


Figure 3-1. 6K-ERB08 functional block diagram

Components

Major components on the 6K-ERB08 are shown in Figure 3-2.

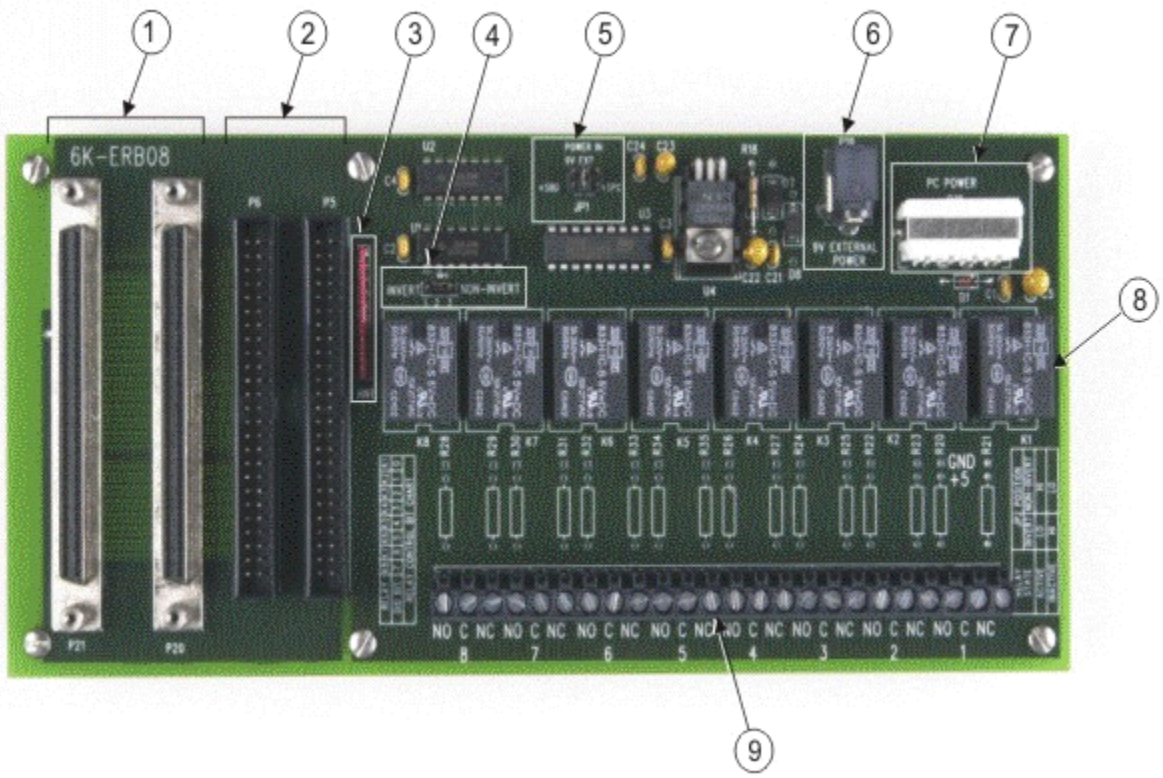


Figure 3-2. 6K-ERB08 component locations

Table 3-8 describes the board's major components.

Table 3-8. 6K-ERB08 component descriptions

Callout	Board label	Description
1	P21, P20	100-pin interface connectors for connecting to the 6000 Series control board or different accessory boards.
2	P6, P5	50-pin interface connectors for connecting to the 6000 Series control board or different accessory boards.
3	RN1	Pull-down resistor to control the state of the relay control lines when not driven by the control board.
4	JP2	Jumper to configure the relay logic for active high or low.
5	JP1	Main +5 V power jumper to select the power source — internal power from the 6000 Series control board, external power from the computer, or external power from the AC adapter.
6	P19	External power connector. Connect to the AC adapter.
7	P18	External power connector. Connect to the computer's +5 V supply.
8	K1 to K8	Relays <1:8>. These relays are controlled digitally by the 6000 Series control board's digital bits DIO<0:7>.
9	1 to 8	Relay screw terminals <1:8>. The screw terminals are for the common (C), normally open (NO) and normally closed (NC) contacts for relays 1 through 8.

Screw terminal connections

Connect external devices to the relay contacts using the 6K-ERB08 screw terminals. Each relay has a common (C), normally closed (NC), and normally open (NO) contact. Figure 3-3 shows the screw terminals on a typical relay channel.

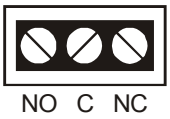


Figure 3-3. Typical relay channel

The relay configuration is illustrated in Figure 3-4. You can install a pull-up or pull-down resistor at the NO and NC terminals on each relay.

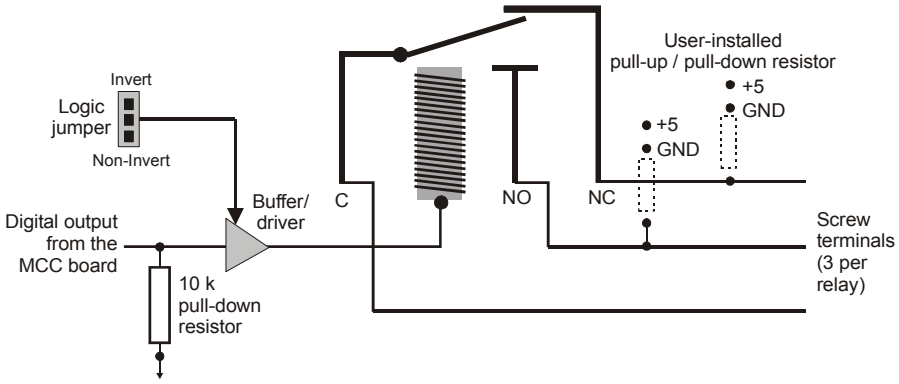


Figure 3-4. Relay configuration

Caution! Before connecting signal wires to the relay screw terminals, turn off the power to the 6K-ERB08, and make sure that the signal wires do not contain live voltages.

Wire gauge

Use 12 AWG to 20 AWG wire to connect field devices. Properly insulate the wires to avoid any short circuit to the other connections, ground, or other points on the board.

Power up conditions

The state of the relay modules at power up depends on both the state of the digital signals controlling them and the relay logic jumper setting.

- When you set the relay logic jumper to **NON-INVERT**, the C and NC contacts are connected when the 6K-ERB08 is disconnected from the 6000 Series control board or when the digital lines on the 6000 Series control board are in high impedance (or input) mode.
- When you set the relay logic jumper to **INVERT**, the C and NO contacts are connected when the 6K-ERB08 is disconnected from the 6000 Series control board, or when the digital lines on the 6000 Series control board are in high impedance (or input) mode.

Relay contact protection circuit for inductive loads

When you connect an inductive load to a relay, energy stored in the inductive load can induce a large voltage surge when you switch the relay. This voltage can severely damage the relay contacts. To limit the voltage surge across the inductive load, install a kickback diode across the DC load. Refer to the contact protection circuit in Figure 3-5. For AC loads, install a metal oxide varistor (MOV).

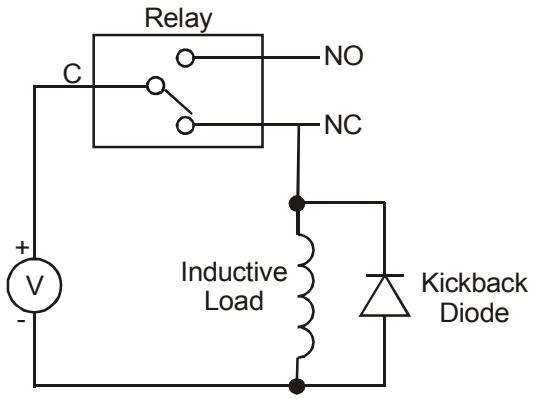


Figure 3-5. Relay contact protection circuit

6K-ERB08 assembly diagram

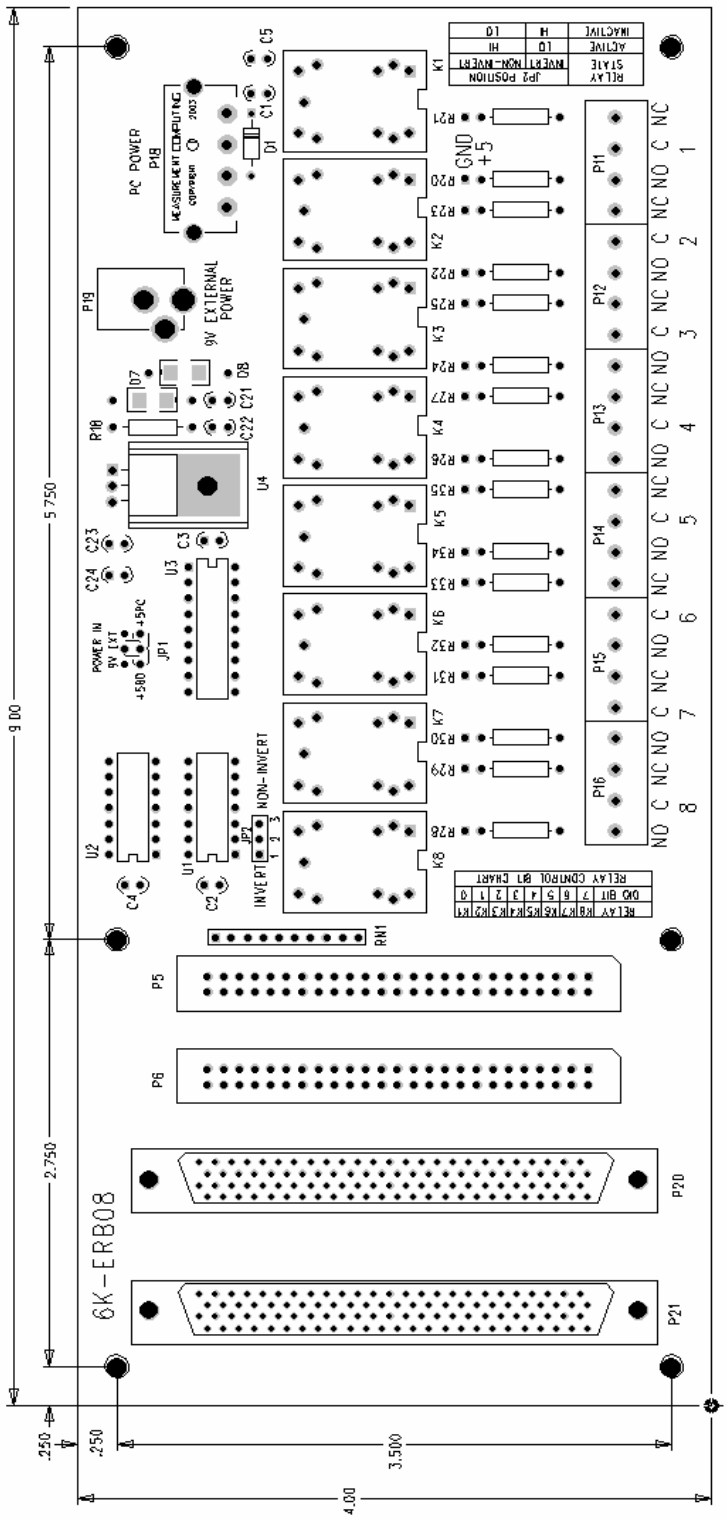


Figure 3-6. 6K-ERB08 assembly diagram

Specifications

Typical for 25 °C unless otherwise specified.
Specifications in *italic text* are guaranteed by design.

Power consumption

Table 1. Power consumption specifications

5 V PC auxiliary power / PCI bus power / external regulated	All relays off	15 mA typical, 20 mA max.
	All relays on	480 mA typical, 550 mA max.
External 7.5 V to 15 V unregulated supply	All relays off	20 mA typical, 25 mA max.
	All relays on	500 mA typical, 580 mA max.

Output specification

Table 2. Output specifications

Number	8
Contact configuration	8 Form C (SPDT) NO, NC and Common available at screw terminals
Contact rating	*6 A @ 120 VAC or 28 VDC resistive*
Contact resistance	100 milliohms max (initial value)
Operate time	*10 milliseconds max*
Release time	*5 milliseconds max*
Vibration	*10 to 55 Hz (amplitude 1.5 mm)*
Shock	*10 G (11 milliseconds)*
Dielectric isolation (between open contact)	*300 VAC, 50/60 Hz (1 minute)*
Life expectancy	*10 million mechanical operations, min*
Power on state (no connection to DIO)	Not energized. NC in contact to Common. (JP2 in NON-INVERT position)

Environmental

Table 3. Environmental specifications

Operating temperature range	0 to 70 °C
Storage temperature range	-40 to 100 °C
Humidity	0 to 95% non-condensing

Mechanical

Table 4. Mechanical specifications

Card dimensions (without standoff)	229 mm (L) x 102 mm (W) x 20 mm (H) 9" (L) x 4" (W) x 0.8" (H)
Weight	0.6 lb.

Relay screw terminals

Table 5. Relay screw terminal specifications

Wire gauge range	*12 AWG to 20 AWG*

Table 6. Screw terminal pin out

Pin	Signal Name
1-NO	Relay 1 Normally Open contact
1-C	Relay 1 Common contact
1-NC	Relay 1 Normally Closed contact
2-NO	Relay 2 Normally Open contact
2-C	Relay 2 Common contact
2-NC	Relay 2 Normally Closed contact
3-NO	Relay 3 Normally Open contact
3-C	Relay 3 Common contact
3-NC	Relay 3 Normally Closed contact
4-NO	Relay 4 Normally Open contact
4-C	Relay 4 Common contact
4-NC	Relay 4 Normally Closed contact
5-NO	Relay 5 Normally Open contact
5-C	Relay 5 Common contact
5-NC	Relay 5 Normally Closed contact
6-NO	Relay 6 Normally Open contact
6-C	Relay 6 Common contact
6-NC	Relay 6 Normally Closed contact
7-NO	Relay 7 Normally Open contact
7-C	Relay 7 Common contact
7-NC	Relay 7 Normally Closed contact
8-NO	Relay 8 Normally Open contact
8-C	Relay 8 Common contact
8-NC	Relay 8 Normally Closed contact

Relay logic jumper (JP2)

Table 7. JP2 specifications

Invert (1-2)	Relay activates when DIO is LOW
Non-invert (2-3) (default)	Relay activates when DIO is HIGH

Power-in jumper (JP1)

Table 8. JP1 specifications

+5PC	Use cable C-PCPOWER-10
+9V EXT	Use Adapter CB-PWR-9
+5BD (default)	Powered from 100-pin connector

Relays pull-up/down option

Table 9. Relay pull-up/down specifications

R21,23,25,27,29,31,33,35	Relays NC pin pull-up/down
R20,22,24,26,28,30,32,34	Relays NO pin pull-up/down

Compatible products

Table 10. Compatible product specifications

Analog input boards	▪ PCI-DAS6013 ▪ PCI-DAS6014 ▪ PCI-DAS6030 ▪ PCI-DAS6031 ▪ PCI-DAS6032 ▪ PCI-DAS6033 ▪ PCI-DAS6034 ▪ PCI-DAS6035 ▪ PCI-DAS6036 ▪ PCI-DAS6052 ▪ PCI-DAS6023 ▪ PCI-DAS6025 ▪ PCI-DAS6040 ▪ PCI-DAS6070 ▪ PCI-DAS6071
Analog output boards	▪ PCI-DAC6702 ▪ PCI-DAC6703

Note 1: The 6K-ERB08 requires external power (for all products above) when used with C100HD50 (pins 51-100) ribbon cable.

Main connectors and pin out

User connector P20

Table 11. Connector P20 specifications

Connector type	Shielded SCSI 100 D-type
Compatible cables	C100MMS-x, shielded round cable. x = 1, 2 or 3 meters

Table 12. P20 pin out

Pin	Signal name	Pin	Signal name
1	P21 Pass Through 1	51	P21 Pass Through 51
2	P21 Pass Through 2	52	P21 Pass Through 52
3	P21 Pass Through 3	53	P21 Pass Through 53
4	P21 Pass Through 4	54	P21 Pass Through 54
5	P21 Pass Through 5	55	P21 Pass Through 55
6	P21 Pass Through 6	56	P21 Pass Through 56
7	P21 Pass Through 7	57	P21 Pass Through 57
8	P21 Pass Through 8	58	P21 Pass Through 58
9	P21 Pass Through 9	59	P21 Pass Through 59
10	P21 Pass Through 10	60	P21 Pass Through 60
11	P21 Pass Through 11	61	P21 Pass Through 61
12	P21 Pass Through 12	62	P21 Pass Through 62
13	P21 Pass Through 13	63	P21 Pass Through 63
14	P21 Pass Through 14	64	P21 Pass Through 64
15	P21 Pass Through 15	65	P21 Pass Through 65
16	P21 Pass Through 16	66	P21 Pass Through 66
17	P21 Pass Through 17	67	P21 Pass Through 67
18	P21 Pass Through 18	68	P21 Pass Through 68
19	P21 Pass Through 19	69	P21 Pass Through 69
20	P21 Pass Through 20	70	P21 Pass Through 70
21	P21 Pass Through 21	71	P21 Pass Through 71
22	P21 Pass Through 22	72	P21 Pass Through 72
23	P21 Pass Through 23	73	P21 Pass Through 73
24	P21 Pass Through 24	74	P21 Pass Through 74
25	P21 Pass Through 25	75	P21 Pass Through 75
26	P21 Pass Through 26	76	P21 Pass Through 76
27	P21 Pass Through 27	77	P21 Pass Through 77
28	P21 Pass Through 28	78	P21 Pass Through 78

Pin	Signal name	Pin	Signal name
29	P21 Pass Through 29	79	P21 Pass Through 79
30	P21 Pass Through 30	80	P21 Pass Through 80
31	P21 Pass Through 31	81	P21 Pass Through 81
32	P21 Pass Through 32	82	P21 Pass Through 82
33	P21 Pass Through 33	83	P21 Pass Through 83
34	P21 Pass Through 34	84	P21 Pass Through 84
35	P21 Pass Through 35	85	DIO0
36	P21 Pass Through 36	86	DIO1
37	P21 Pass Through 37	87	DIO2
38	P21 Pass Through 38	88	DIO3
39	PC +5V	89	DIO4
40	P21 Pass Through 40	90	DIO5
41	P21 Pass Through 41	91	DIO6
42	P21 Pass Through 42	92	DIO7
43	P21 Pass Through 43	93	P21 Pass Through 93
44	P21 Pass Through 44	94	P21 Pass Through 94
45	P21 Pass Through 45	95	P21 Pass Through 95
46	P21 Pass Through 46	96	P21 Pass Through 96
47	P21 Pass Through 47	97	P21 Pass Through 97
48	P21 Pass Through 48	98	P21 Pass Through 98
49	P21 Pass Through 49	99	P21 Pass Through 99
50	GND	100	GND

User connector P21

Table 13. Connector P21 specifications

Connector type	Shielded SCSI 100 D-type
Compatible cables	C100MMS-x, shielded round cable. x =1, 2 or 3 meters

Table 14. P21 pin out

Pin	Signal name	Pin	Signal name
1	P20 Pass Through 1	51	P20 Pass Through 51
2	P20 Pass Through 2	52	P20 Pass Through 52
3	P20 Pass Through 3	53	P20 Pass Through 53
4	P20 Pass Through 4	54	P20 Pass Through 54
5	P20 Pass Through 5	55	P20 Pass Through 55
6	P20 Pass Through 6	56	P20 Pass Through 56
7	P20 Pass Through 7	57	P20 Pass Through 57
8	P20 Pass Through 8	58	P20 Pass Through 58
9	P20 Pass Through 9	59	P20 Pass Through 59
10	P20 Pass Through 10	60	P20 Pass Through 60
11	P20 Pass Through 11	61	P20 Pass Through 61
12	P20 Pass Through 12	62	P20 Pass Through 62
13	P20 Pass Through 13	63	P20 Pass Through 63
14	P20 Pass Through 14	64	P20 Pass Through 64
15	P20 Pass Through 15	65	P20 Pass Through 65
16	P20 Pass Through 16	66	P20 Pass Through 66
17	P20 Pass Through 17	67	P20 Pass Through 67
18	P20 Pass Through 18	68	P20 Pass Through 68
19	P20 Pass Through 19	69	P20 Pass Through 69
20	P20 Pass Through 20	70	P20 Pass Through 70
21	P20 Pass Through 21	71	P20 Pass Through 71
22	P20 Pass Through 22	72	P20 Pass Through 72
23	P20 Pass Through 23	73	P20 Pass Through 73
24	P20 Pass Through 24	74	P20 Pass Through 74
25	P20 Pass Through 25	75	P20 Pass Through 75
26	P20 Pass Through 26	76	P20 Pass Through 76
27	P20 Pass Through 27	77	P20 Pass Through 77
28	P20 Pass Through 28	78	P20 Pass Through 78
29	P20 Pass Through 29	79	P20 Pass Through 79
30	P20 Pass Through 30	80	P20 Pass Through 80
31	P20 Pass Through 31	81	P20 Pass Through 81
32	P20 Pass Through 32	82	P20 Pass Through 82
33	P20 Pass Through 33	83	P20 Pass Through 83
34	P20 Pass Through 34	84	P20 Pass Through 84
35	P20 Pass Through 35	85	DIO0
36	P20 Pass Through 36	86	DIO1

Pin	Signal name	Pin	Signal name
37	P20 Pass Through 37	87	DIO2
38	P20 Pass Through 38	88	DIO3
39	PC +5V	89	DIO4
40	P20 Pass Through 40	90	DIO5
41	P20 Pass Through 41	91	DIO6
42	P20 Pass Through 42	92	DIO7
43	P20 Pass Through 43	93	P20 Pass Through 93
44	P20 Pass Through 44	94	P20 Pass Through 94
45	P20 Pass Through 45	95	P20 Pass Through 95
46	P20 Pass Through 46	96	P20 Pass Through 96
47	P20 Pass Through 47	97	P20 Pass Through 97
48	P20 Pass Through 48	98	P20 Pass Through 98
49	P20 Pass Through 49	99	P20 Pass Through 99
50	GND	100	GND

User connector P5

Table 15. Connector P5 specifications

Connector type	Unshielded 50-pin ribbon connector - male
Compatible cables	C100HD50-x, C50FF-x, unshielded ribbon cable. x = 3 or 6 feet

Table 16. P5 pin out

Pin	Signal name	Pin	Signal name
1	P6 Pass Through 51	26	P6 Pass Through 76
2	P6 Pass Through 52	27	P6 Pass Through 77
3	P6 Pass Through 53	28	P6 Pass Through 78
4	P6 Pass Through 54	29	P6 Pass Through 79
5	P6 Pass Through 55	30	P6 Pass Through 80
6	P6 Pass Through 56	31	P6 Pass Through 81
7	P6 Pass Through 57	32	P6 Pass Through 82
8	P6 Pass Through 58	33	P6 Pass Through 83
9	P6 Pass Through 59	34	P6 Pass Through 84
10	P6 Pass Through 60	35	DIO0
11	P6 Pass Through 61	36	DIO1
12	P6 Pass Through 62	37	DIO2
13	P6 Pass Through 63	38	DIO3
14	P6 Pass Through 64	39	DIO4
15	P6 Pass Through 65	40	DIO5
16	P6 Pass Through 66	41	DIO6
17	P6 Pass Through 67	42	DIO7
18	P6 Pass Through 68	43	P6 Pass Through 93
19	P6 Pass Through 69	44	P6 Pass Through 94
20	P6 Pass Through 70	45	P6 Pass Through 95
21	P6 Pass Through 71	46	P6 Pass Through 96
22	P6 Pass Through 72	47	P6 Pass Through 97
23	P6 Pass Through 73	48	P6 Pass Through 98
24	P6 Pass Through 74	49	P6 Pass Through 99
25	P6 Pass Through 75	50	GND

User connector P6

Table 17. Connector P6 specifications

Connector type	Unshielded 50 pin ribbon connector - male
Compatible cables	C100HD50-x, C50FF-x, unshielded ribbon cable. x = 3 or 6 feet

Table 18. P6 pin out

Pin	Signal name	Pin	Signal name
1	P5 Pass Through 51	26	P5 Pass Through 76
2	P5 Pass Through 52	27	P5 Pass Through 77
3	P5 Pass Through 53	28	P5 Pass Through 78
4	P5 Pass Through 54	29	P5 Pass Through 79
5	P5 Pass Through 55	30	P5 Pass Through 80
6	P5 Pass Through 56	31	P5 Pass Through 81
7	P5 Pass Through 57	32	P5 Pass Through 82
8	P5 Pass Through 58	33	P5 Pass Through 83
9	P5 Pass Through 59	34	P5 Pass Through 84
10	P5 Pass Through 60	35	DIO0
11	P5 Pass Through 61	36	DIO1
12	P5 Pass Through 62	37	DIO2
13	P5 Pass Through 63	38	DIO3
14	P5 Pass Through 64	39	DIO4
15	P5 Pass Through 65	40	DIO5
16	P5 Pass Through 66	41	DIO6
17	P5 Pass Through 67	42	DIO7
18	P5 Pass Through 68	43	P5 Pass Through 93
19	P5 Pass Through 69	44	P5 Pass Through 94
20	P5 Pass Through 70	45	P5 Pass Through 95
21	P5 Pass Through 71	46	P5 Pass Through 96
22	P5 Pass Through 72	47	P5 Pass Through 97
23	P5 Pass Through 73	48	P5 Pass Through 98
24	P5 Pass Through 74	49	P5 Pass Through 99
25	P5 Pass Through 75	50	GND

CE Declaration of Conformity

Manufacturer: Measurement Computing Corporation
Address: 10 Commerce Way
Suite 1008
Norton, MA 02766
USA

Measurement Computing Corporation declares under sole responsibility that the product

6K-ERB08

to which this declaration relates is in conformity with the relevant provisions of the following standards or other documents:

EU EMC Directive 89/336/EEC: Electromagnetic Compatibility, EN 61326 (1997) Amendment 1 (1998)

Emissions: Group 1, Class A

- EN 55011 (1990)/CISPR 11: Radiated and Conducted emissions.

Immunity: EN61326, Annex A

- IEC 1000-4-2 (1995): Electrostatic Discharge immunity, Criteria C.
- IEC 1000-4-3 (1995): Radiated Electromagnetic Field immunity Criteria A.
- IEC 1000-4-4 (1995): Electric Fast Transient Burst immunity Criteria B.
- IEC 1000-4-5 (1995): Surge immunity Criteria A.
- IEC 1000-4-6 (1996): Radio Frequency Common Mode immunity Criteria A.
- IEC 1000-4-8 (1994): Magnetic Field immunity Criteria A.
- IEC 1000-4-11 (1994): Voltage Dip and Interrupt immunity Criteria A.

Declaration of Conformity based on tests conducted by Chomerics Test Services, Woburn, MA 01801, USA in April, 2005. Test records are outlined in Chomerics Test Report #EMI3931.04.

We hereby declare that the equipment specified conforms to the above Directives and Standards.

Carl Haapaoja, Director of Quality Assurance

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